

The Challenge of Sustaining a Nationally Competitive Public Research University

The Commonwealth's flagship public university campus at the University of Massachusetts Amherst confronts a significant challenge. UMass Amherst needs 250 more faculty to compete for students, attract external funds, and deliver a high quality curriculum. While faculty numbers have declined, so too have campus facilities deteriorated. Investment in facilities by the state will allow the campus to use its operating budget to fund faculty positions instead of renovation and renewal of buildings. Over the past decade, significant declines in public finance and critical renovation and renewal of facilities reduced the institution's faculty size below the levels required for continued nationally competitive performance.

The Problem: While Massachusetts has a significant public higher education and university presence, it has only one major public research university capable of competing on behalf of the Commonwealth among the top public research universities in America. Once at a size of about 1200 faculty in the late 1980s, UMass Amherst appeared ready to take its place among the top fifty or better premier public institutions. A very strong research base, rapidly improving student quality, innovative programs in the humanities, social sciences, and professions, all put this campus in the center of America's public higher education enterprise. Sequential reverses in the economic capabilities of the Commonwealth prompted a series of budget cuts never restored and a retreat from funding the maintenance and renewal of the institution's physical plant. This, in turn, resulted in a modest decline in student numbers and a dramatic decline in faculty numbers primarily through early retirements never replaced.

The Choice: The most recent cycle of budget reductions presents the institution with a decision about its future. The campus can manage to sustain an acceptable level of instructional quality and manage a modest research profile within the constraints of current operations, but it cannot maintain currently nationally competitive programs for students or the current research portfolio it carries for the Commonwealth without confronting the significant issues highlighted by the inadequate number of continuing faculty.

The Structural Deficit: The details of this dilemma are complex, but the structural issues are simple. The campus must grow by 250 faculty members over the next four years to continue as a successful national flagship institution. This requires an increase in the operating budget of approximately \$30 million. Over the years, the campus has responded to the inadequate support of its physical plant by sustaining as large a faculty as possible while at the same time postponing maintenance and renewal of facilities in anticipation of future funding. Today, this is no longer possible as buildings must enter the renovation-renewal cycle or close. The campus has already committed to a minimal capital renovation and renewal plan that will cost approximately \$65 million a year by 2009 to address about 40% of the demonstrated need.

The requirement to sustain a safe and functional campus environment leaves no funding available to rebuild the continuing faculty base on which the institution's quality resides and on which its economic success depends. We must do both the facilities renovation and the faculty rebuilding to remain in the category of major public flagship university.

Sources of Funding: Funding for these requirements must come from many sources, and no single source can provide a complete solution.

- ***Students*** have already increased their contribution to the support of this public university through a series of significant cost increases over the past five years. The rates paid by students are now about as high as they can go, and we will do well to increase them at the rate of inflation for the next ten years. Significant additional increases in student-generated revenue do not appear possible.
- ***Research dollars*** earned by a highly competitive faculty multiply the investment in faculty. Grants and contracts help pay for research space and renovations, lab equipment, graduate student stipends. Research dollars also help drive the economic development agenda of the region and the Commonwealth. Nonetheless, while the current faculty have a remarkably competitive research profile, there are too few of them to keep the institution at critical mass in many fields and disciplines. We can anticipate that the research of 250 additional faculty can pay for an additional \$43 million in research expenditures, and we

also know from national experience that success at this scale leads to an acceleration of research growth beyond the direct research activity of the faculty.

- **Private fundraising** is a key source of new funding. Donors will help support the extra cost of high quality instruction and student programs as well as high quality research and creative activity, but only if the institution is on a success track and the state maintains its matching program for private gifts. Private donors leverage public money through matching programs, support scholarships and fellowships, pay part of new and renovated facilities costs, and assist with the recruitment of talented faculty and students. UMass Amherst has great capacity to expand this source of revenue. The recent entry of the campus into the realm of major fundraising in the 1990s clearly indicated the capacity and interest of the campus' alumni and friends, and the current campaign process will drive the campus into the middle of the public university fundraising scale. This revenue is essential to support the reentry of the institution into the competition among public flagship institutions.
- **Continuing education**, distance education, outreach programs, intellectual property development, and a host of other special programs can and will generate additional revenue to contribute some of the costs of leveraging the value of the 250 faculty beyond the basic expense of compensation to increase the quality of student programming, financial aid, and economic development initiatives.
- **Public Investment**: Even with all the self-help, every efficiency, and the commitment to engage in every battle for effective management of the institution, UMass Amherst requires a public investment of either \$30 million for additional continuing faculty support or \$30 million for renovation and renewal of facilities to sustain its role as Massachusetts' flagship public research university. The attached tables give a quick view of the budget, faculty/student size, and the projections that underlie this challenge.

Economic Development: UMass Amherst is a major generator of economic development in addition to educational opportunity and research and training. Its operating revenue today is about \$615 million. Using standard multipliers, this generates economic value to the communities of western Massachusetts of about \$1.6 billion. It currently employs about 7,000 people in various jobs. Within that \$615 million, the campus produces about \$97 million in total contract and grant expenditures per year. The campus produces about 5,300 graduates per year and a large majority of them stay in Massachusetts to contribute to the high quality labor force of the Commonwealth. Distributed primarily in the Eastern and Western parts of the state, Amherst graduates, even after they go on to professional or graduate school, end up in the Commonwealth. An increase in master's level graduates, projected from the increase in faculty, will provide an added benefit to the Commonwealth's economic development plans. About 63% of our recent alumni reside in Massachusetts.

The Competitive Challenge

While the Commonwealth has a superb complement of private institutions, four of which are in a collaborative consortium with UMass Amherst called the Five Colleges Inc., it has only one major public research university along with its outstanding public medical school. Many of the state's competitors across the nation have two or more major public research universities along with major public medical centers.

The decision point that we have before us is whether we will be able to sustain the flagship status of this institution. We all have to do more. Students have done their share. The alumni and friends must invest much more than in the past. The faculty and staff must become even more efficient and effective in both teaching and research. The institution's outreach programs must become more productive. The Commonwealth must fund either the essential capital repair and renovation or the required additional faculty core investment.

Attachments:

Projected Impact of 250 Additional Continuing Faculty: Data

Projected Impact of 250 Additional Continuing Faculty: Program

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Decline in Continuing Faculty Totals

FY88	1,201	FY97	1,057
FY89	1,197	FY98	1,046
FY90	1,176	FY99	1,015
FY91	1,133	FY00	1,039
FY92	1,101	FY01	1,031
FY93	1,063	FY02	1,019
FY94	1,091	FY03	913
FY95	1,090	FY04	921
FY96	1,052	FY05	921

Competitive Institutions, Continuing Faculty Totals

University of Illinois – Urbana-Champaign	2,196
Indiana University – Bloomington	1,227
University of California – Berkeley	1,312
University of Massachusetts – Amherst	921

Improve Student/Faculty Ratios

Fall 2000	21:1
Fall 2004	24:1
Fall 2009 (with 250 additional faculty)	19:1

Increase Number of Faculty-Taught Sections of Less Than 20 Students

Median section size in general education offerings increased by 10% between FY01 and FY04. The differences vary among colleges. In Biological Science, for example, the median section size grew from 44 in FY01 to 78 in FY04.	
Between the Fall of 1999 and the Fall of 2004, there was a 15% decrease in the number of unique undergraduate course offerings. The biggest losses were in upper division courses (18%) which tend to be smaller. During the same time, undergraduate enrollment dropped by only 2%.	
# of current faculty-taught sections with less than 20 students	633
Add 250 faculty - # of faculty-taught sections with less than 20 students	764

Increase Campus Research Productivity

Current Dollars Spent on Campus from Sponsored Research	\$97 million
Dollars from Sponsored Research by 2009 after adding 250 faculty	\$140 million

Increase # of Active Master's Degree Students

Current Active Master's Fall 2004	1,692
Additional 625 Active Master's by 2009 w/ 250 additional faculty	2,317

Projected Impact of 250 Additional Continuing Faculty: Program

Life Sciences and Biotechnology

The Amherst campus has a strong base in the life sciences ranging from basic research at the cellular and organismic level to the exciting new discoveries at the interface of chemistry and biology to applications in such areas as neuroscience and animal biotechnology. These fields represent some of the most rapidly growing areas of funded research and the foundation of the Commonwealth's future economic competitiveness. Faculty growth in these areas will drive up research funding at a rate half again as high as the campus average, and will permit increases in the production of new Ph.D.s in these high-demand fields.

Liberal Education

Many of the high-paying, high-demand careers of the new economy rely on broadly educated individuals who can create and adapt in many different environments. Traditionally, education of this kind was provided through familiar programs in the humanities and social sciences. Increasingly, however, we are creating opportunities for creative and entrepreneurial minds to draw from the traditions of multiple disciplines, to mix practical training in one area with a deeper understanding from another, and to develop the habits of mind that encourage inquiry throughout a lifetime of change. Faculty growth in this area is particularly important in meeting student demand at the undergraduate level, where students explore their interests and aptitudes to prepare for careers or further study.

Engineering, Natural Sciences, and Computer Science

These fields are critical to the Commonwealth's success in the knowledge economy, and they will be at the center of the next wave of innovation. The growth in such fields as nanotechnology, polymer science, robotics, artificial intelligence, remote sensing, and information retrieval has been staggering, and shows no signs of abating. These disciplines are among the most productive on campus in terms of sponsored research, and make major contributions to both established and emerging Massachusetts industries.

Environment and Health

The application of scientific understanding to pressing problems of human health, the natural environment, and climate change has spawned many new industries and areas of inquiry. Research into factors promoting human health and longevity, remediation methods for biological hazards, and developing sustainable strategies for economic development will all be critical in the years ahead, and targeted faculty investment will allow us to remain at the cutting edge of fields with widespread human and social consequences.

Professional Preparation

While some students see college as a time for exploration and preparation for further study, others are focused on specific career objectives demanding high-quality instruction from faculty with recognized expertise. Demand for students with rigorous professional preparation is strong in fields ranging from Nursing to Management to Education. In many cases these University-trained professionals are graduating and going on to immediately fill key positions in the economy. Our ability to make these fresh infusions of talent and energy into the life of the Commonwealth is limited by the size of the faculty, and investments here will have an immediate and lasting impact.